

Hydraulic Fracturing Fluid Product Disclosure - BSOA 14-14-15 H-1

CHESAPEAKE

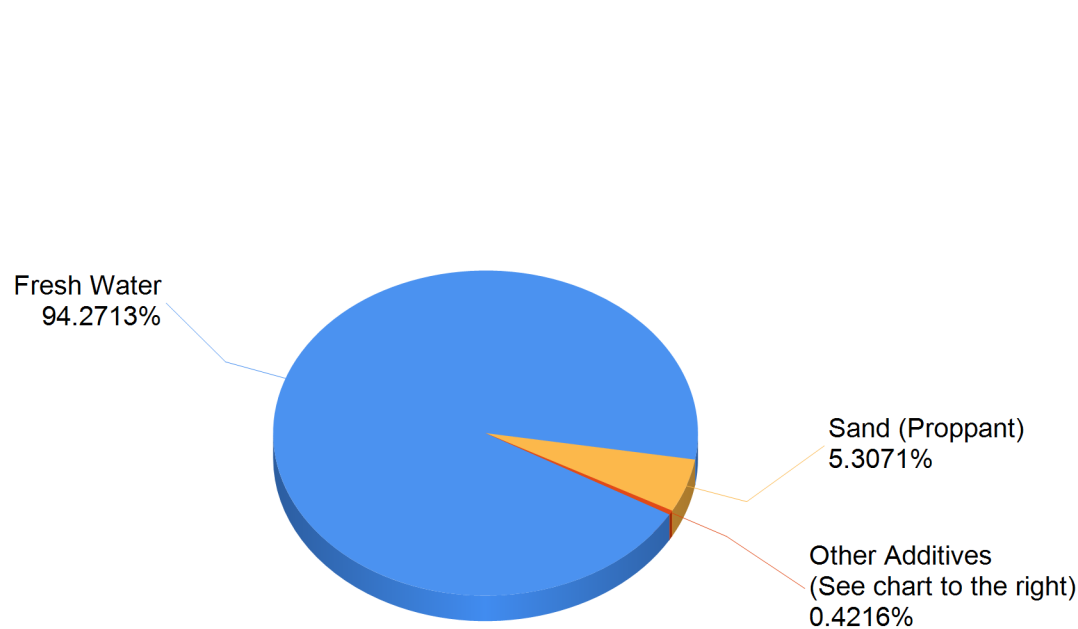


API #	1703125233	County	DE SOTO	Fracture Date	3/21/2011
Surface Casing Depth (ft)		State	LOUISIANA	Proppant Mass Pumped (lbs)	6,483,848
True Vertical Depth of Well (ft)	11,978.3	Longitude	-93.87097	Water Volume Pumped (gals)	5,210,226
Play	HAYNESVILLE SHALE	Latitude	32.20899	Frac Fluid Volume Total (gals)	5,526,841
Well Type	HORIZONTAL	Lat/Long Projection	NAD 27	Total Fluid Mass Pumped (lbs)	50,195,696

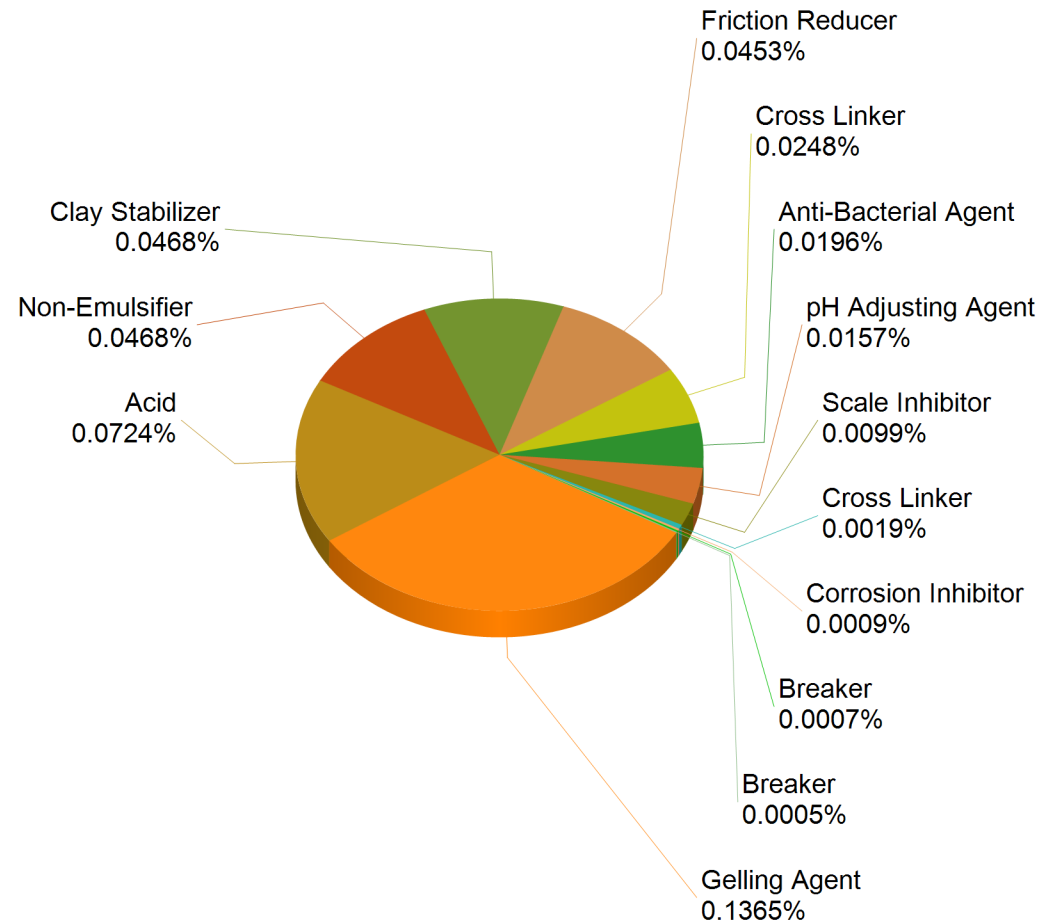
Product Type	Purpose	Downhole Result	Other Common Uses	Product Name	Total Volume Used in Well	Overall % by Total Volume
Water	Expand fracture and deliver sand	Some stays in formation while remainder returns with natural formation water as "produced water" (actual amounts returned vary from well to well)	Landscaping, manufacturing	Fresh Water	5,210,226	94.2713 %
Sand (Proppant)	Allows the fractures to remain open so the gas can escape	Stays in formation, embedded in fractures (used to "prop" fractures open)	Drinking water filtration, play sand, concrete and brick mortar	Sand (Proppant)	293,315	5.3071 %
Acid Package Hydrochloric Acid Corrosion Inhibitor Iron Control	Helps dissolve minerals and initiate cracks in the rock	Reacts with minerals present in the formation to create salts, water, and carbon dioxide.	Swimming pool chemical and cleaner	Acid, 15% HCl	4,000	0.0724 %
	Prevents the corrosion of the pipe	Bonds to metal surfaces (pipe) downhole. Any remaining product not bonded is broken down by micro-organisms and consumed or returned in produced water.	Used in pharmaceuticals, acrylic fibers and plastics	I-22	48	0.0009 %
Gelling Agent	Thickens the water in order to suspend the sand	Combines with the "breaker" in the formation thus making it much easier for the fluid to flow to the borehole and return in produced water.	Cosmetics, baked goods, ice cream, toothpaste, sauces, and salad dressings	SG-15M	7,545	0.1365 %
Non-Emulsifier	Used to break or separate oil / water mixtures (emulsions)	Generally returned with produced water, but in some formations may enter the gas stream and return in the produced natural gas.	Used in food and beverage processing, pharmaceuticals, and water treatment	NE-21	2,586	0.0468 %
Clay Stabilizer	Creates a brine carrier fluid	Reacts with clays in the formation through a sodium - potassium ion exchange. Reaction results in sodium chloride (table salt) which is returned in produced water.	Used in low-sodium table salt substitute, medicines, and IV fluids	CS-125C	2,586	0.0468 %
Friction Reducer	"Slicks" the water to minimize friction	Remains in the formation where temperature and exposure to the "breaker" allows it to be broken down and consumed by naturally occurring micro-organisms. A small amount returns with produced water.	Used in cosmetics including hair, make-up, nail and skin products	FRA-4	2,506	0.0453 %
Cross Linker	Maintains fluid viscosity as temperature increases	Combines with the "breaker" in the formation to create salts that are returned in produced water.	Used in laundry detergents, hand soaps and cosmetics	CX-14G	1,370	0.0248 %
				CX-14A	105	0.0019 %
Anti-Bacterial Agent	Eliminates bacteria in the water that produces corrosive by-products	Reacts with micro-organisms that may be present in the treatment fluid and formation. These micro-organisms break down the product with a small amount of the product returning in produced water.	Disinfectant; sterilizer for medical and dental equipment	MC B-8642 (WS)	1,082	0.0196 %

pH Adjusting Agent	Maintains the effectiveness of other components, such as crosslinkers	Reacts with acidic agents in the treatment fluid to maintain a neutral (non-acidic, non-alkaline) pH. Reaction results in mineral salts, water and carbon dioxide which is returned in produced water.	Used in laundry detergents, soap, water softener and dish washer detergents	BUFFER H	866	0.0157 %
Scale Inhibitor	Prevents scale deposits in the pipe	Product attaches to the formation downhole. The majority of product returns with produced water while remaining reacts with micro-organisms that break down and consume the product.	Used in household cleansers, de-icer, paints, and caulk	MC S-2510T (WS)	545	0.0099 %
Breaker	Allows a delayed break down the gel	Reacts with the "crosslinker" and "gel" once in the formation making it easier for the fluid to flow to the borehole. Reaction produces ammonia and sulfate salts which are returned in produced water.	Used in hair coloring, as a disinfectant, and in the manufacture of common household plastics	GB-4	36	0.0007 %
				GB-2	25	0.0005 %

Hydraulic Fracturing Fluid Breakdown by Volume



Details for the Other Additives worth 0.4216% of Total Volume



Hydraulic Fracturing Fluid Product Component Information Disclosure - BSOA 14-14-15 H-1
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Supplier	Product Type	Product Name	Total Product Pumped (gals)	Total Product Mass (lbs)	Component Listed on MSDS	Chemical Abstract Service Number (CAS #)	MAXIMUM Component Concentration of Product (% by Mass)	MAXIMUM Component Mass Pumped (lbs)	MAXIMUM Component Concentration Pumped (% by Mass)	MAXIMUM Parts per Million (PPM) by Mass
CUDD ENERGY SERVICES	Acid	Acid, 15% HCl	4,000	36,072	Water	007732-18-5	85.00%	30,661	0.06108%	611
					Hydrochloric Acid	007647-01-0	15.00%	5,411	0.01078%	108
	Non-Emulsifier	NE-21	2,586	20,513	Methanol	000067-56-1	30.00%	6,154	0.01226%	123
					Oxyalkylated alcohols	N/A	30.00%	6,154	0.01226%	123
					Ethoxylated Alcohols	N/A	10.00%	2,051	0.00409%	41
	Gelling Agent	SG-15M	7,545	63,001	Petroleum Distillate	064742-47-8	55.00%	34,650	0.06903%	690
					Guar Gum	009000-30-0	50.00%	31,500	0.06276%	628
					Clay	014808-60-7	2.00%	1,260	0.00251%	25
					Surfactant	068439-51-0	2.00%	1,260	0.00251%	25
	pH Adjusting Agent	BUFFER H	866	11,064	Water	007732-18-5	94.50%	10,455	0.02083%	208
					Sodium Hydroxide	001310-73-2	51.50%	5,698	0.01135%	114
					Sodium Chloride	007647-14-5	5.00%	553	0.00110%	11
	Breaker	GB-2	25	420	Ammonium Persulfate	007727-54-0	100.00%	420	0.00084%	8
		GB-4	36	605	Proprietary	N/A	100.00%	605	0.00121%	12
	Cross Linker	CX-14A	105	1,140	Sodium Tetraborate	001330-43-4	25.00%	285	0.00057%	6
		CX-14G	1,370	12,240	Petroleum Distillate Hydrotreated Light	064742-47-8	60.00%	7,344	0.01463%	146

CUDD ENERGY SERVICES	Corrosion Inhibitor	I-22	48	445	Formic Acid	000064-18-6	60.00%	267	0.00053%	5
					Aromatic aldehyde	N/A	30.00%	133	0.00027%	3
					Haloalkyl heteropolycycle salt	N/A	30.00%	133	0.00027%	3
					Oxyalkylated Fatty Acid	N/A	30.00%	133	0.00027%	3
					Isopropanol	000067-63-0	5.00%	22	0.00004%	0
					Methanol	000067-56-1	5.00%	22	0.00004%	0
					Organic sulfur compound	N/A	5.00%	22	0.00004%	0
					Quaternary ammonium compound	N/A	5.00%	22	0.00004%	0
					Benzyl Chloride	000100-44-7	1.00%	4	0.00001%	0
	Clay Stabilizer	CS-125C	2,586	23,536	No Hazardous Components	NONE			0.00000%	0
	Friction Reducer	FRA-4	2,506	22,390	No Hazardous Components	NONE			0.00000%	0
MULTI-CHEM GROUP LLC	Scale Inhibitor	MC S-2510T (WS)	545	5,097	Ethylene Glycol	000107-21-1	60.00%	3,058	0.00609%	61
					Sodium Hydroxide	001310-73-2	5.00%	255	0.00051%	5
	Anti-Bacterial Agent	MC B-8642 (WS)	1,082	9,938	Glutaraldehyde (Pentanediol)	000111-30-8	60.00%	5,963	0.01188%	119
					Quaternary Ammonium Compound	068424-85-1	10.00%	994	0.00198%	20
					Ethanol	000064-17-5	1.00%	99	0.00020%	2

All component information listed was obtained from supplier Material Safety Data Sheets (MSDS). The Occupational Safety and Health Administration (OSHA) sets the criteria for the disclosure of this information. Please note that Federal Law protects "proprietary", "trade secret", and "confidential business information" and the criteria for how this information is reported on an MSDS is subject to 29 CFR 1910.1200 (i). As a result, the Operator does not have the legal authority to disclose any supplier "proprietary", "trade secret", or "confidential business information".